REMARKS

This paper is being submitted in response to the Final Office Action mailed March 30, 2010. Claims 1–7 and 9–13 are currently pending, with claim 8 previously cancelled without prejudice and claims 14–20 previously withdrawn as drawn to a non-elected invention. No new matter is introduced by this Amendment.

Rejection under 35 U.S.C. § 103

1. The Examiner rejected claims 1–13 under 35 U.S.C. § 103(a) as obvious over Goodwin et al. (WO 03/086031) in view of Swihart et al. (U.S. Patent No. 4,447,499). Applicants respectfully traverse.

Goodwin et al. disclose an atmospheric pressure plasma assembly and methods for treating a substrate using the disclosed assembly (*see generally* Goodwin et al., at [00011]). The assembly includes a first and second pair of vertically arrayed, parallel spaced-apart planar electrodes with at least one dielectric plate between said first pair, adjacent one electrode and at least one dielectric plate between said second pair adjacent one electrode. The spacing between the dielectric plate and the other dielectric plate or electrode of each of the first and second pairs of electrodes forms a first and second plasma region. The assembly further includes a means of transporting a substrate successively through said first and second plasma regions and an atomizer adapted to introduce an atomized liquid or solid coating making material into one of said first or second plasma regions (*see, e.g. id.*, at [0019]).

Swihart et al. describe adhesive-releasing silicone coatings, and methods for applying the coatings to substrate. The coating composition includes a polydiorganosiloxane compound of the formula $R_3SiO(MeQSiO)_x(Me_2SiO)_ySiR_3$, and a UV-radiation photosensitizer soluble in the polydiorganosiloxane (*see* Swihart et al., at col. 2, ll. 45–67). The composition is applied to the substrate and then cured by applying UV radiation. Swihart et al. also disclose paper and polymer materials coated by the methods of the invention (*see id.*, at col. 3, ll. 4–5).

Claim 1 recites a method for coating a substrate with an inorganic-organic hybrid polymer material using the Dielectric Barrier Discharge (DBD) technique. The method includes steps of introducing a sample in the space between two electrodes, controlling the atmosphere between the electrodes, generating a plasma discharge between the electrodes, and mixing aerosols containing hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing, into the plasma discharge.

To make a *prima facie* case of obviousness, the teachings of the prior art should have suggested the claimed subject matter to the person of ordinary skill in the art, and all the claim limitations must be taught or suggested in the references cited by the Examiner. *In re Kotzab,* 217 F.3d 1365, 1370 (Fed. Cir. 2000). As articulated by the Supreme Court in a recent case, a combination is obvious if it is no more than the predictable use of known elements according to their established functions; and there was a reason to combine the known elements. *KSR Intl Co. v. Teleflex, Inc.,* 550 U.S. 398 (2007). To make *a prima facie* case of obviousness, "it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." *Id.* The initial burden to make *a prima facie* case of obviousness is on the Examiner. *In re Bell,* 991 F.2d 781, 783 (Fed. Cir. 1993). Applicants submit that the Examiner does not make a *prima facie* case of obviousness, because all the limitations of the present claims are not taught by the reference cited in the Office Action.

The Examiner contends that Goodwin is directed to a process of depositing coatings on substrates, and that different precursors can be used, including polydimethyl siloxane precursors, and further states that such polydimethylsiloxane precursors can be made by sol-gel methods. Applicants respectfully disagree with this contention, and submit that the Examiner mischaracterizes the disclosure of Goodwin. The Goodwin reference provides that the reactive agent being coated is *a liquid or solid* (see Goodwin, at para. [0052]). Therefore, the agent can only be a liquid **or** a solid and not a sol-gel, and the reference effectively teaches away from a sol-gel chemistry, which is something different from either a pure liquid or a pure solid. A person of skill in the art would not be motivated to arrive at a sol-gel as the reactive agent for coating, when the reference expressly teaches only solid OR liquid reactive agents.

The Examiner concedes that Goodwin does not teach how the polydimethyl siloxane precursors are made. Instead, the Examiner cites Swihart, noting that Swihart teaches that these precursors can be made by conventional methods. However, Swihart describes a number of different techniques, and does not provide any specific direction that would require selection of sol-gel methods for making the siloxane precursors. The person of skill in the art would have to select the sol-gel method out of the many other methods described in the reference, when Swihart itself ascribes no particular importance to sol-gel methods for preparing the siloxane precursors. The person of skill in the art would have no motivation to *sua sponte* select sol-gel methods out of all the methods described in Swihart to prepare the polydimethyl siloxane precursors for coating in Goodwin, and indeed, the person of skill in the art would not make such a modification in view of the disclosure of only liquid or solid reactive agents for coating in Goodwin. Thus, the combination of Goodwin with Swihart to arrive at the invention of the present claims is based on hindsight reasoning and does not form the basis for a case of *prima facie* obviousness.

The combination of Goodwin and Swihart fails to render the claims obvious for at least the following additional reasons. Goodwin recites that coating forming compositions comprising silicon containing materials may be used [0040]. From a chemical point of view, the materials suggested by Goodwin do not form *cross-links,* or *polymerize* by themselves but only under the influence of a cross-linking agent. As such, the starting materials relate to simple monomers, and Applicants submit that the person skilled in the art would not be motivated to use this specific example, instead of one of a large number of other monomers cited in the reference, except as a result of hindsight.

Furthermore, according to Goodwin, a plasma forms polymers to be deposited on the substrate from monomers. Whether cross-links are formed depends on the energy in the plasma and the presence of free radicals or other active species, for example. Monomers will generally not form cross-links, or will do so only at very low densities. Therefore, the person of skill in the art would not expect the materials disclosed in Goodwin to form cross-links as recited in the present claims. In sum, Goodwin does not relate to using *cross-linked pre-polymers* as a starting

material and the person of skill in the art would not be motivated to select the materials in Goodwin to make the cross-linked precursors recited in the present claims.

The present invention also differs from the methods disclosed in Goodwin and Swihart by a *chemical* distinction, and as a result the characteristics of coatings obtained are significantly different (e.g. in terms of network density, degree of cross-linking, etc.). The invention embodied by the present claims includes components that are cross-linked ("pre-polymers") prior to their contact with the plasma, and superior characteristics, such as higher cross-linking density, are obtained in the deposited layer. In addition, the present chemistry further involves a sol-gel being injected into the plasma, which is clearly not taught in the combination of references cited by the Examiner. A person of skill in the art, reading Goodwin, would not be motivated to choose hybrid inorganic/organic *pre-cross-linked pre-polymers* as starting material to be injected in the plasma, since Goodwin does not teach or suggest pre-cross-linked pre-polymers. Therefore, the disclosure of Goodwin does not motivate the person of skill in the art to improve cross-linking of the coating material in order to avoid *post-curing*, an extra step that increases costs.

These deficiencies of the Goodwin reference are not cured by Swihart. Swihart relates to the curing by UV exposure of polydiorganosiloxanes free of highly reactive substituents, and containing hydroxyl radicals, or certain lower alkyl radicals. Swihart discloses that exposure times for adhesives are highly reduced when exposing polydiorganosiloxanes free of highly reactive substituents to UV radiation. Swihart thus provides a process improvement by using a polymer starting material, but which is not equivalent to the pre-polymers used in the present invention, and does not result in a process that avoid costly post-curing steps. Indeed, Swihart explicitly provides that polydiorganosiloxane components can be further crosslinked by UV post-curing, in contrast to the present claims. The person of skill in the art, trying to make polymer coatings with improved properties by increasing the degree of cross-linking would not be motivated by the disclosure in Swihart to arrive at the present claims. In particular, reading Swihart, the person of skill in the art would not be motivated to turn to a plasma technique for improved curing, because Swihart recommends UV for curing.

Finally, Applicants submit that the Examples in the Specification describe the unexpected behavior of materials produced by the methods of the present invention. Briefly, the Examples

illustrate precursor polymer solutions according to the present invention (*see id.*, at p. 19). Inorganic cross-linking due to condensation reactions occurs during plasma treatment. It was initially thought that the condensation reaction in sol-gel systems would start only at high temperatures and over a duration of several hours. However, it was unexpectedly and remarkably discovered that the methods of the present invention (using plasma exposition) allow such condensation reactions to occur at low temperatures and with very short treatment times (on the order of minutes) (*see id.*, at p. 19, ll. 11–18). This unexpected behavior is a new and unexpected result in view of the prior art existing at the time of invention, and could not be predicted from the prior art recited by the Examiner.

In view of the foregoing, Applicants submit the Examiner has failed to make a *prima facie* case of obviousness, as all the limitations of the present claims are not taught in the combination of Goodwin and Swihart references. Therefore, the rejection of claim 1 as obvious over the combination of Goodwin and Swihart is unwarranted, and withdrawal of the same is respectfully requested. Claims 2–7 and 9–13 depend from claim 1 and incorporate all the limitations thereof. Since claim 1 is not *prima facie* obvious over the combination of Goodwin and Swihart, claims 2–7 and 9–13 are also not obvious.

2. Claim 3 was additionally rejected under 35 U.S.C. 103(a) as obvious over Goodwin et al. in view of Swihart et al. as applied to claim 1, further in view of Chow et al. (U.S. Patent Pub. No. 2002/0031658). Applicants respectfully traverse the rejection.

The above discussion of Goodwin et al. and Swihart et al. is fully incorporated herein. Briefly, the combination of Goodwin et al. and Swihart et al. do not render claim 1 *prima facie* obvious, because the method of the present claims is not taught or suggested in Goodwin and Swihart. Furthermore, the method of claim 1 demonstrates surprising and unexpected results in view of the prior art cited in the Office Action.

Claim 3 recites the method of claim 1, where the aerosol includes a compositional gradient of the pre-polymers and/or any additional admixed components. The claim depends directly from claim 1 and incorporates all the limitations of that claim.

The Examiner concedes that the combination does not teach or suggest the formation of multilayer coatings in a plasma treatment, and cites Chow et al. for the missing teaching. Applicants submit that Chow et al. do not cure the deficiencies of Goodwin and Swihart.

Chow et al. describe spray deposition of liquid precursor coating material onto a substrate (*see* Chow et al., at paragraphs [0013]). The methods in Chow et al. are described as "suitable for producing multilayer materials." A fine composition gradient can be formed by varying the composition of the precursor composition (*see id.*, at Abstract and paragraph [0027]).

However, Chow et al. do not teach or suggest the invention of claim 3, as the reference does not cure the deficiencies of Goodwin et al. and Swihart et al. with respect to claim 1. Specifically, there is nothing in Chow et al. that would suggest formation of the precursor polymers at conditions of low temperature and in a very short period of time using a plasma technique. Therefore, the result of the method of claim 1 remains unexpected and surprising in view of the combination of Goodwin et al., Swihart et al., and Chow et al. Claim 3 is therefore similarly unexpected and not *prima facie* obvious over the cited references.

In view of the above remarks, claim 3 is not obvious under 35 U.S.C. § 103(a) over Goodwin et al. and Swihart et al. The rejection has been overcome, and withdrawal of the same is respectfully requested.

SUMMARY

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Please consider this a PETITION FOR EXTENSION OF TIME for a sufficient number of months to enter these papers or any future reply, if appropriate. Please charge any additional fees or credit overpayment to Deposit Account No. 13-2725.

Respectfully submitted,

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